

# cleanupdate

U.S. DEPARTMENT OF ENERGY/BROOKHAVEN NATIONAL LABORATORY/ASSOCIATED UNIVERSITIES INC.

THE OFFICE OF ENVIRONMENTAL RESTORATION — VOL.2/NO.3/SEPT. 1997

## Summer projects set stage for Fall

*A message from Bill Gunther, Manager, Office of Environmental Restoration*

This summer has been an extremely busy one for the men and women of BNL's Office of Environmental Restoration (OER), with several remediation projects in different stages going on simultaneously at the BNL site.

### Excavation complete

We've completed work on the first phase of our biggest construction project this summer, involving the excavation of 53 former waste pits. These pits, known as the Chemical/Animal Pits and Glass Holes, were used from the late-1950s to 1981 for the disposal of chemical containers, rinsed laboratory glassware and animal carcasses.

As of mid-August, all 53 pits and holes had been successfully excavated, yielding more than 8,000 cubic yards of material and potentially contaminated soil. OER is now focusing on the characterization, sorting and off-site disposal of the excavated waste and soils. The project is scheduled to be completed later this fall.

*(continued on page 8)*

## inside

Off-site cleanup expected  
**See page 3**

Plumes and remediation  
**See pages 4-5**



*Representatives from the N.Y. State Department of Environmental Conservation and BNL regularly collect samples from the Peconic River and other area rivers, lakes and ponds.*

## Stakeholders' input key to determining Peconic area cleanup

Over the next several months, the U.S. Department of Energy (DOE) and Brookhaven National Laboratory (BNL) will be seeking public input on alternatives for remediating contamination found near the Lab's Sewage Treatment Plant.

The plant, used to process sanitary and industrial sewage from the Lab's facilities, is located in the eastern-central portion of the site. Approximately 800,000 gallons per day of treated water are discharged from the plant into the headwaters of the Peconic River, on BNL property north of the plant. The complex includes several processing build-

ings, a settling tank, six active sand filter beds and two storage ponds.

### Investigation results

An investigation of the area found elevated levels of heavy metals (e.g. silver and mercury), and low levels of radionuclides (including cesium-137), in surface and subsurface soils at the sewage treatment plant. Downstream of the plant's discharge, on the BNL site, sediment samples indicated the presence of heavy metals and low levels of radionuclides.

The sewage treatment plant area was first used by the Army camp that formerly occupied the BNL

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## ***EPA and DEC continue review of second Record of Decision***

The final review process continues for the Operable Unit VI "Record of Decision" (ROD). The Lab's second ROD is under review by the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and New York State Department of Environmental Conservation (NYSDEC), the three agencies overseeing BNL's Superfund cleanup.

The Operable Unit VI ROD documents the remediation strategy for groundwater contamination from ethylene dibromide (EDB) in an undeveloped area of Manorville. EDB, once commonly used as a pesticide, was applied to the Lab's Biology Fields around 1970. The remediation strategy includes public water hookups, natural attenuation (dilution and decay), and additional monitoring.

The ROD is a major step in the Superfund process, signifying that all characterization and evaluation of remedial action alternatives have been completed. It includes a "Responsiveness Summary," which documents community input and summarizes DOE's responses to questions and concerns raised during the comment period.

The ROD will be available this fall at the Lab's four information repositories (for locations, see page 7). Its Administrative Record reference will be BNL/OU6/12.1. ■

## ***First of 2 consultation reports due this autumn from ATSDR***

The Agency for Toxic Substances and Disease Registry (ATSDR), an agency within the U.S. Department of Health and Human Services, is expected to release its Brookhaven National Laboratory (BNL) groundwater health consultation by early fall. Based upon site-specific analysis, this report will summarize on- and off-site groundwater contamination from past practices at BNL and discuss the potential for public exposure to and health-related concerns from this contamination.

A 60-day public comment period will give the community an opportunity to comment on the findings, evaluate whether the community's concerns have been adequately addressed and provide ATSDR with additional relevant information.

The public will be able to find the document at the Lab's four information repositories (for locations, see page 7), or call (404) 639-6068 for a copy. Comments should be addressed to: Andy Dudley, Environmental Health Specialist, U.S. Department of Health and Human Services, ATSDR, Atlanta, Georgia 30333.

ATSDR is also completing an air quality consultation, which will be released following the groundwater health consultation. Historic and current air emissions from BNL facilities will be reviewed to determine if they present a potential health risk to the public or BNL employees. ■

## hookupdate

The Shirley/North Shirley/East Yaphank and Weeks Avenue area of Manorville hookups are essentially completed, including restoration of roads and lawns.

Installation and chlorination of water mains are complete for the northern part of the remaining Manorville hookup area. About half of the water mains have been installed in the remainder.

To date, the U.S. Department of Energy (DOE) has spent more than \$5.6 million on this project, and more than 850 residents have been provided with public water.

All hookups are expected to be completed by the end of December. Unseasonable weather conditions in the fall/winter could delay landscaping and repaving.

It is important that all eligible residents and business owners in all areas recognize that once work in Manorville is completed (i.e., December 31, 1997), DOE will consider the project to be completed and there will be little, if any, opportunity for DOE to provide additional hookups. The contract with the Suffolk County Water Authority (SCWA) will be closed, and no financial mechanism will be in place for compensating the SCWA or residents for work done after that date. ■

### cleanupdate

A bi-monthly newsletter from the Office of Environmental Restoration ([www.oer.dir.bnl.gov](http://www.oer.dir.bnl.gov)) at Brookhaven National Laboratory, *cleanupdate* is part of an on-going effort to inform people about environmental restoration issues and activities at the Lab. If you would like to be on the Office of Environmental Restoration mailing list, or if you have any questions about the cleanup, please contact:

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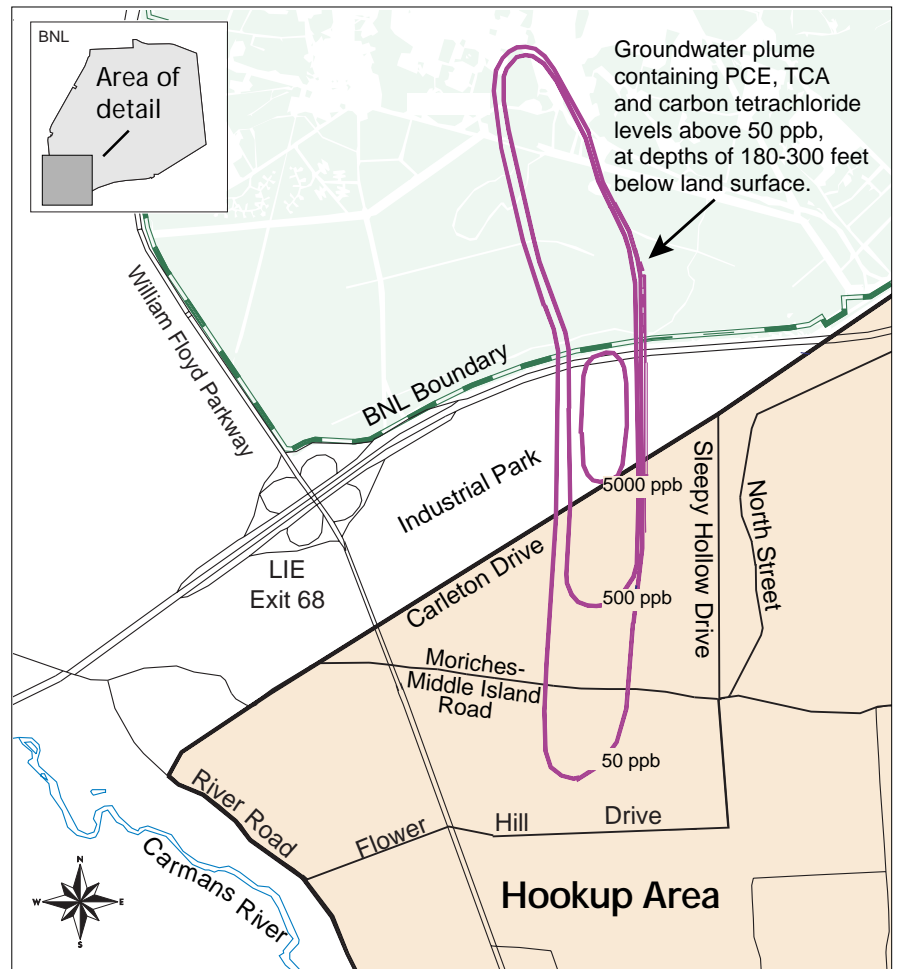
John Carter, Mary Dernbach or Peter Genzer  
Community Relations Coordinators  
516-344-5195 ([o2b@bnl.gov](mailto:o2b@bnl.gov)), 344-6336 ([derny@bnl.gov](mailto:derny@bnl.gov)) 344-3174 ([genzer@bnl.gov](mailto:genzer@bnl.gov))

# Off-site remediation option eyed for chemical groundwater plume

The U.S. Department of Energy (DOE) and Brookhaven National Laboratory (BNL) are currently evaluating remediation options for portions of a groundwater contaminant plume extending beyond the Lab's southern boundary.

To date, the Office of Environmental Restoration (OER) has detected six distinct chemical groundwater plumes emanating from known and unknown sources within the Lab site (see story, page 4). One of these plumes, originating from the center of the site, extends into an area of North Shirley/East Yaphank just south of the Lab's southern boundary.

The off-site part of the plume is comprised primarily of carbon tetrachloride, a solvent once widely used at the Lab and in industry for degreasing equipment. The solvent has been detected in on- and off-site monitoring wells at depths of 180-300 feet, at concentrations as high as 5,100 parts per billion (ppb). This is approximately 1,000 times the U.S. Environmental Protection Agency (EPA) and New York State drinking water standard of 5 ppb.



A remediation system will be constructed to treat the highest levels of contamination.

## Sampling, hookup complete

In 1995, when the plume was detected, DOE and BNL, in cooperation with Suffolk County, began a residential well sampling program in the area to ensure no contamination from BNL was affecting private wells. Although the results showed no contamination from BNL above drinking water standards, DOE offered homes in the area free connections to public water as a precautionary measure.

Construction of a pump-and-treat system to address the on-site portion of the plume was completed in June, preventing any further off-site migration of high levels of solvents. BNL is investigating alternatives for treating the portion of the plume that has already moved off site.

Although there is no "pathway" of exposure for area residents, the contamination is at a high enough concentration that DOE and BNL are planning to actively remediate the plume. A groundwater treatment system will be constructed where contaminant levels are highest. The two treatment systems being considered for this action are:

- **In-well air sparging:** This relatively new technology works by forcing pressurized air through a well into the contaminated groundwater. The air then bubbles upward, removing volatile organic compounds (VOCs, such as carbon tetrachloride) from the water and carrying them upward within the well to the surface. The compounds, in gaseous form, are then either released into the air at concentrations below state and federal emissions standards, or sent through an above-ground air treatment system. The clean water is re-injected into the ground without ever reaching the surface.

- **Pump-and-treat:** Pump-and-treat systems work by extracting contaminated groundwater and pumping it to an above-ground treatment system. The chemicals are removed by the treatment system and the clean water is recharged (returned to the ground) through a recharge basin or injection wells.

An emissions filtering system may also be used with this option, depending on the type of system used

(continued on page 7)

## Chemical plumes

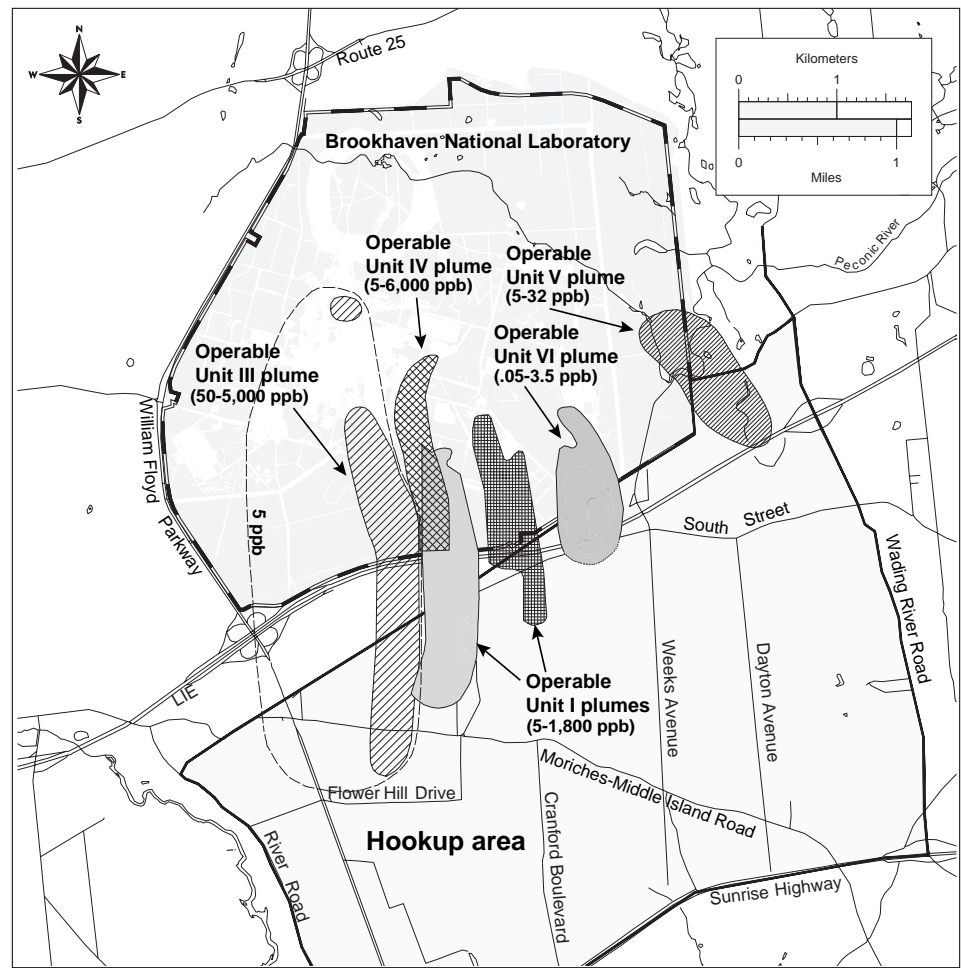
# Solvents are key concern in aquifer

To date, BNL's Office of Environmental Restoration has identified six distinct chemical groundwater plumes originating within the Lab site (see map, right). Three treatment systems have been constructed to prevent the migration of these contaminants and remove them from the aquifer. Construction of a fourth is under way. Although these plumes do not impact private water wells, more than 1,300 property owners south and east of the Lab have been offered hookups to public water as a precautionary measure.

Plumes form when chemicals enter the ground through an accidental or intentional release. After entering the top levels of the soil, the chemicals are pushed deeper into the ground by precipitation, eventually reaching the top levels of the water table. Once it reaches this point, the contamination migrates with groundwater at a slow rate, diluting, spreading and moving deeper within the aquifer. BNL's plumes generally travel south within the aquifer at a rate of about one foot per day.

At BNL, each plume has been classified by the geographical and administrative area of the Lab or "Operable Unit" in which it is located. The following is an overview of each plume:

**The Operable Unit I plumes** are comprised primarily of solvents known as "volatile organic compounds," or VOCs, including tetrachloroethene (PCE), trichloroethene (TCE) and carbon tetrachloride. The plumes are located at depths between 180 and 210 feet below land surface,



at concentrations ranging from 5 to 1,800 parts per billion (ppb). Area residents have been offered public water.

Two groundwater extraction wells were installed at BNL's site boundary last year, part of a pump-and-treat system currently treating this plume.

**The Operable Unit III plume** also contains PCE, TCE, carbon tetrachloride and another solvent known as trichloroethane (TCA). It is located at depths between 180 and 300 feet below land surface, and contaminant levels from 5 to 5,000 ppb have been detected in monitoring wells. In June, a pump-and-treat system at the site boundary began operation to prevent further migration off the BNL site. An investigation of the full extent of groundwater contamination in this area is still proceeding (see story, page 3). Area residents have been offered public water.

**The Operable Unit IV plume** consists of petroleum breakdown

products like benzene, toluene and xylene. It is fully contained within the BNL site, and located at depths up to 80 feet below land surface. Contaminant levels ranging from 5 to 6,000 ppb have been detected in monitoring wells. A treatment system is under construction to remediate area groundwater.

**The Operable Unit V plume** contains TCE at levels ranging from 5 to 32 ppb. It is located 190 to 230 feet below land surface. Area residents have been offered public water.

**The Operable Unit VI plume** consists of a pesticide known as ethylene dibromide (EDB), and is found between 90 and 130 feet below the land surface. Concentrations of EDB from .05 to 3.5 ppb have been detected. Area residents have been offered public water.

The selected remedy for this area, currently under review by regulators, involves natural attenuation of the EDB through dilution and decay along with additional monitoring. ■



## Cleanup systems

# BNL applies technologies to plumes

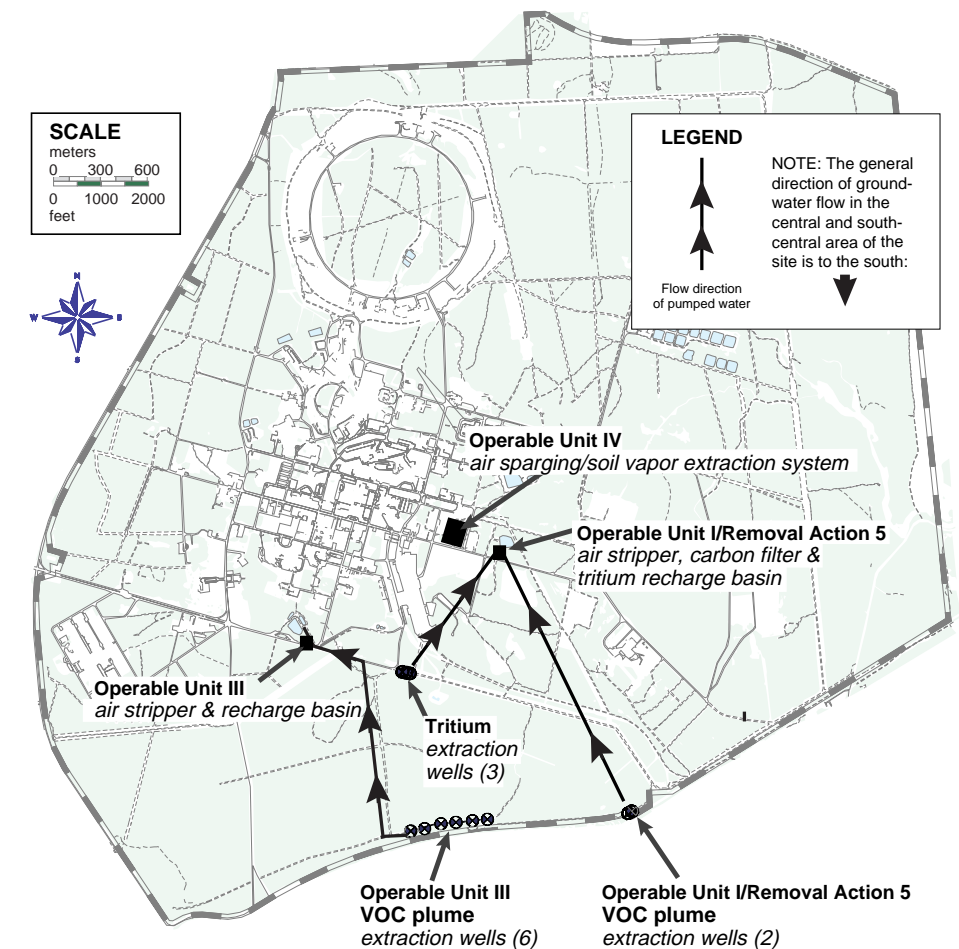
A primary mission of BNL's Office of Environmental Restoration is the remediation of soil and groundwater contamination and the prevention of additional contamination migrating off the Brookhaven site.

To that end, three groundwater treatment systems are currently operating at BNL, with a fourth now under construction. The map (right) shows the four systems and their locations. To summarize each system and its purpose:

**Operable Unit III Remediation System:** Construction of the Operable Unit III pump-and-treat system was completed in June, and the system is now working at full capacity. The system uses six wells to extract contaminated groundwater from the aquifer. The water is pumped to an air stripping tower, where air from a powerful blower separates volatile organic compounds (VOCs) from the water. The clean water is recharged (returned to the ground) and the VOCs are released into the air at concentrations below state and federal emissions standards.

The system was constructed to treat a plume of VOCs moving south from unidentified sources (still under investigation) in the developed central portion of the Lab site. It is currently processing approximately 600 gallons of water per minute. After the VOCs are removed, the clean water is discharged into a new recharge basin located approximately one mile north of the site's southern boundary.

**Operable Unit I/Removal Action V Pump-and-Treat:** This system (operational since Decem-



ber 1996) was constructed to remediate a plume of VOCs originating from the Lab's Current Landfill (now closed and capped) and the Hazardous Waste Management Facility. It uses two extraction wells to process more than 700 gallons of water per minute, and, like the Operable Unit III system, removes close to 100 percent of the chemical contamination.

**Tritium Remediation System:** Three groundwater extraction wells have been installed 3,500 feet south of the High Flux Beam Reactor's spent fuel pool to address the on-site tritium plume. Tritiated groundwater is pumped from the aquifer at a rate of about 120 gallons per minute and piped north to a treatment facility and recharge basin. The water is treated with carbon to remove chemical contamination that is also present in groundwater in the area due to other past BNL activities. The system, constructed as an interim

action, will prevent tritiated water above the U.S. Environmental Protection Agency's drinking water standard of 20,000 picocuries/liter from leaving the Lab site while remediation options for the higher concentrations of tritium close to the reactor are evaluated.

**Operable Unit IV Air Sparging/Soil Vapor Extraction System:** This remediation system, now under construction, combines two technologies to remove contaminants from soil and groundwater. Air sparging and soil vapor extraction work together, forcing pressurized air into the groundwater to bubble these volatile compounds out of the water and soil and carry them upward. Powerful vacuum pumps then recover the resulting vapors and pipe them to a treatment facility. The system is being constructed to treat soils and groundwater containing volatile and semi-volatile organic compounds from a 1977 fuel oil spill. ■

# Peconic River...

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site during world wars I and II. BNL began using the sewage plant area in 1947, and this contamination can be attributed to past disposal practices at the site.

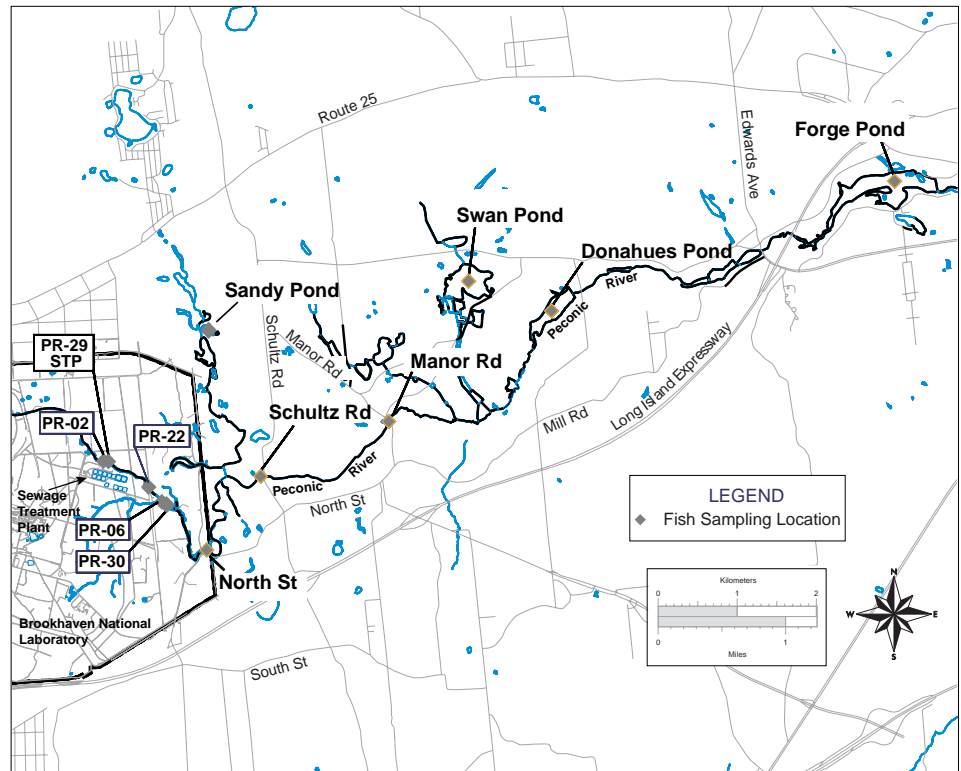
Because the Laboratory's disposal practices have changed, current effluent from the plant is not expected to cause such contamination. Since 1970, the effluent from the facility has been regulated by the New York State Department of Environmental Conservation (NYSDEC). Today's Laboratory discharges are monitored daily, and meet the stringent requirements of a NYSDEC permit.

The investigation also determined that low levels of tritium and volatile organic compounds, including trichloroethene (TCE), are present in area groundwater. TCE was commonly used in industry and at the Lab as a degreasing agent to remove oil and other petroleum products from metal parts and machinery.

Low levels of tritium are routinely discharged from the plant, and may enter groundwater through the river's bed. In 1995 and 1996, 17 groundwater monitoring wells between Wading River Road and the plant were sampled and tested for tritium. The highest levels detected were approximately one-tenth of the drinking water standard. Eight of the wells sampled showed no detectable tritium.

## Actions taken

In 1996, 64,000 gallons of sludge containing some low-levels of radioactivity were removed from two World War II-era settling tanks (Imhoff tanks) at the plant and shipped to an



Fish samples were collected at 12 locations along and near the Peconic River.

off-site, permitted waste disposal site. The tanks were dismantled and the area was covered with clean fill in a project completed earlier this year.

The Sewage Treatment Plant is currently being upgraded, with construction expected to be completed by the end of 1997. The new design will employ ultraviolet disinfection and two aeration tanks to significantly reduce the amounts of nitrogen and organic matter being discharged from the plant.

The Lab is now focusing on possible sediment remediation alternatives, and a public meeting will be held early next year to discuss remediation alternatives.

## Risks assessed

Food chain models determined that potential risks to fish and other aquatic species exist, particularly from exposure to silver and mercury, and an additional study was conducted to measure the levels of these contaminants in Peconic River fish.

Fish and sediment samples were collected from 12 stations in the river located between the Sewage Treatment Plant and Forge Pond in Riverhead (12 miles downstream from the plant) and analyzed for metals, pesticides, polychlorinated biphenyls (PCBs) and radionuclides.

## Bioaccumulation studied

Preliminary data, now being validated, indicate measurable levels of mercury and PCBs in fish collected on the Laboratory site, downstream of the Sewage Treatment Plant. No off site fish were collected with detectable levels of PCBs.

Once validated, the results will be forwarded to the EPA and N.Y. State Department of Environmental Conservation for review, then included in the remedial investigation/risk assessment report.

## Additional studies

An additional study was conducted to explain why the levels of metals in fish are lower than expected relative to the sediment concentrations. These data indi

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***Libraries — All reports from BNL's Office of Environmental Restoration are available at:***

Longwood Public Library  
800 Middle Country Road  
Middle Island NY 11953  
516-924-6400  
e-mail:  
helpdesk@suffolk.lib.ny.us

Mastics-Moriches-Shirley  
Community Library  
301 William Floyd Parkway  
Shirley NY 11967  
516-399-1511  
www.li.net/~mmscl

BNL Research Library  
Building 477A  
Brookhaven Avenue  
Upton NY 11973  
516-344-3483  
http://www.bnl.gov

U.S. EPA Region II Library  
Administrative Records Room  
290 Broadway  
New York NY 10007-1866  
212-637-4296

## *Off-site work...* (continued from page 3)

and the contaminant levels present in the ground-water.

Currently, three pump-and-treat systems are operating at BNL, and they have proven effective in removing VOCs from groundwater. In-well air sparging, meanwhile, has also been effective in removing

contamination at other sites and in a pilot study performed last year at BNL. An evaluation of these two technologies will be documented in a "pre-design report," scheduled for completion by the end of 1997.

*The Operable Unit III Remedial Investigation/Risk Assessment report is expected to be available for review in early 1998 at the Lab's four information repositories (for locations, see above). ■*

## *River cleanup...* (continued from page 6)

cate that sulfides naturally present in the sediment are combining with the metals, preventing them from being ingested by fish.

A toxicity study to analyze ecological impacts was also undertaken to set cleanup goals for the sediments. Results from this study will be part of the remedial investigation/risk assessment report.

### **Remedial alternatives identified**

The remediation alternatives being considered for Peconic River sediments include:

- no action (required by law to be evaluated),
- source removal (dredging of river sediments),
- phytoremediation (use of plants or bacteria to naturally remove contamination).

Both the "no action" and "source removal" alternatives have positive and negative aspects to consider before a final remedy is chosen. Under the "no action" alternative, the source would remain and the ecosystem would remain undisturbed. This alternative would rely on natural sedimentation to minimize exposure of aquatic life to contaminated sediments.

Source removal would include the excavation of contaminated sediments, but could spread contamination further downstream. It would also require the construction of a road through a heavily forested area, as well as the wetland area surrounding the river. This, along with the use of backhoes or bulldozers to remove the sediment, would result in considerable wetland disturbance or destruction.

The "no action" alternative might actually be more protective to wildlife than the source removal

alternative because the ecosystem would not be negatively affected by the excavation process.

Phytoremediation is not expected to be an effective strategy for treating the contamination in place, but is being considered for treating the excavated sediments if the source removal alternative is chosen.

### **Comments sought**

Remediation alternatives will be compared in the "Operable Unit V Feasibility Study" and the "Operable Unit V Proposed Plan," which are expected to be released in early 1998. These two reports will explain remediation alternatives and document the comparison of those alternatives to seven U.S. Environmental Protection Agency (EPA) criteria, which help determine the best option. The proposed plan will document the alternative that BNL, DOE, EPA and NYSDEC believe is most protective of human health and the environment.

The EPA criteria include "public acceptance" of the alternative. DOE and BNL are actively seeking comment on the various remediation alternatives, and scheduled opportunities for public input will include official comment periods this fall on the remedial investigation/risk assessment report, and this winter on the feasibility study and proposed plan. Poster sessions and a public meeting early in 1998 will provide additional feedback to DOE and BNL.

*The "Operable Unit V Remedial Investigation and Risk Assessment Report" will be available for review and comment this fall at the Lab's information repositories (for locations, see above). ■*

## cleanupdate

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### What would you like to read in **cleanupdate**?

*cleanupdate's* purpose is to provide you with information about Superfund cleanup activities at Brookhaven National Laboratory, and we'd like to know whether the newsletter is meeting your information needs. Drop us a line at: *cleanupdate*, Brookhaven National Laboratory, Office of Environmental Restoration Newsletter, Bldg. 51, Upton NY 11973 (web address: <http://www.oer.dir.bnl.gov>).

BNL-OER/9-97

## Message...

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### Progress on projects

Work is also progressing on the capping of the Lab's Interim Landfill. This landfill was used in 1966 following the closure of the Former Landfill (which was capped in 1996) and during the construction of the Current Landfill (closed in 1990 and capped in 1995). This project is expected to be completed this fall as well.

Construction is also well underway on a cleanup system in the central part of the Lab site. Soil and groundwater in this area contain remnants of fuel oil and solvents from a 1977 spill. Two technologies, air sparging and soil vapor extraction, are being combined to remediate the area. The system is scheduled to begin operation early this winter.

### Work, investigations continue

As these projects near completion, work will continue on several others as we move into 1998. The largest project planned involves the cleanup of radioactive soils at the Lab's Hazardous Waste Management Facility and in other areas of the site. The U.S. Department of Energy (DOE) and BNL are proposing to excavate contaminated soils above cleanup goals (approved by the U.S. Environmental Protection Agency and New York State

Department of Environmental Conservation) and dispose of them off-site. A public meeting on this project will be held later this fall to review the various alternatives that were evaluated and solicit community input.

The investigation phase of the Operable Unit V (Sewage Treatment Plant/Peconic River area) project is near completion, and the results are scheduled to be released for public review and comment later this fall (see story, page 1). A public meeting on remediation alternatives for the area is scheduled for early 1998.

An investigation of the western portion of the Lab site is also nearing completion. The Operable Unit III investigation is the final groundwater investigation underway at BNL, and will address the remaining groundwater plumes, including the High Flux Beam Reactor tritium plume. A report documenting the results of the investigation is scheduled to be released in early 1998, and DOE and BNL are currently evaluating options for remediating a groundwater plume that extends beyond the Lab's southern boundary (see story, page 3).

So while this past summer, and year, have been productive, more work remains to be done. The next issue of *cleanupdate* will include an updated schedule of the Superfund process at BNL, including all remediation work planned, completed and underway. ■